

REMARKS

Reconsideration of the subject application is earnestly solicited.

Claims 61 through 78 are pending, with Claims 61, 62, 63, 70, and 73 being independent.

The Official Action asserted that the recitation “wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to the optical axis” of Claims 61 through 63, 70, and 73 is not supported by Japanese Patent Application Nos. 6-239386 and 7-66991 and U.S. Patent Application No. 08/522,118, and required that Applicant show support for said feature. While the Request for Interference filed March 9, 2001, provided such support, the Official Action asserted (1) that Applicant has not stated “how” the cited feature is supported and (2) that the teaching in Japanese Patent Application No. 7-66991 that the lens shape in the sub-scanning direction comprises a spherical surface continuously varying in the direction of image height is inconsistent with the cited feature. All rejections, objections, requirements, and assertions are respectfully traversed.

Applicant respectfully submits that the objected-to recitation is supported in each application. As an initial matter, the recitation must be properly construed. In U.S. Patent No. 5,883,732 (Takada, et al.) from which the recitation was copied, it is stated that “even with lens surfaces that vary continuously in the curvature in the sub-scanning direction, the curvatures in the main and sub-scanning directions will depend on each other if the surfaces are aspheric and symmetric with respect to the optical axis and, therefore, one cannot hold the optical magnification in the sub-scanning direction constant without a sufficient number of the degrees of freedom to achieve simultaneous correction of aberrations in both the main and sub-scanning directions” (col. 5, lines 55-64). Taking this statement and the October 5, 1998 Amendment in

Takada, et al., a copy of which is attached as Tab 1, into consideration, Applicant respectfully submits that it can be seen that rotational asymmetry is implicated by the recitation in question.

In more detail, that Amendment stated:

In other words, the aspherical surface [of Yamakawa] is defined only by the distance from the optical axis no matter which direction it is. Accordingly, the aspherical surface thus defined is symmetrical around the optical axis. Namely, in Yamakawa, the curvatures in the main and sub-scanning directions must depend on each other since the curvatures are symmetrical around the optical axis.

In amended claim 1, as discussed above, the curvature in the sub-scanning direction can be determined independently from the curvature in the main scanning direction since the surface is not symmetrical around the optical axis.

Amendment, p. 4, lines 17-27 (double underline emphasis added). Accordingly, Applicant respectfully submits that --rotational-- asymmetry is at issue.

The claim language having been construed, turning first to Japanese Patent Application No. 7-66991, Applicant respectfully notes that Embodiment 1 states, inter alia, that the “lens shape of the f θ lens in the main scanning direction is an aspherical surface shape which can be represented by a function up to the tenth-order, and the lens shape in the sub scanning direction is comprised of a spherical surface continuously varying in the direction of image height” (emphasis added). (See translation filed March 16, 2000, p. 23, paragraph [0040].) Applicant respectfully notes that paragraphs [0041], [0042], and [0055] describe specific functions and data. Because the shape of the disclosed surface is spherical in the sub-scanning

direction and aspherical in the main scanning direction, Applicant respectfully submits that the surface cannot be rotationally symmetrical, in other words, it cannot be a surface of a “body of rotation” which is defined as a “symmetrical body having the form described by rotating a plane curve about an axis in its plane” as set forth in the McGraw-Hill Science Navigator Dictionary (CD-ROM) excerpt attached as Tab 2. Applicant respectfully submits that if the shape of the lens surface of this embodiment were rotationally symmetrical with respect to the optical axis, then a first curve in a cross-section taken along the vertical plane (extending in the sub-scanning direction) including the optical axis and a second curve in a cross-section taken along the horizontal plane including the optical axis would be the same, whereas in this embodiment the former is spherical and the latter is aspherical as a result of which the lens surface of this embodiment is rotationally non-symmetric. In view of the foregoing, Applicant respectfully submits that the objected-to recitation is supported by Japanese Patent Application No. 7-66991.

Turning to the remaining applications, with the objected-to recitation construed as discussed above, Applicant respectfully submits that the objected-to recitation is supported as follows:

(1) 08/522,118: e.g., p. 11, lines 3-7; p. 18, line 15 through p. 19, line 2 (copy filed March 9, 2001)

(2) 6-239386: e.g., p. 9, [0015], lines 14-16; Fig. 1; p. 11, [0022], lines 5-7; p. 19, [0040], lines 1-15, Eq. 2; p. 19, [0041], lines 1-9, Eq. 3; p. 20, [0042], lines 1-4; Fig. 7, Fig. 8 (translation filed March 9, 2001)

(3) 8-46741: e.g., p. 16, [0018], line 14; p. 17, [0019], line 15; p. 33, [0048], equations (c) and (d); p. 45, [0065], lines 3-6 and equation (e); p. 50, [0076], lines 7-15 and equation (f); Tables 1-5 (translation filed March 16, 2000).

(4) 08/607,169 and 08/951,635: e.g., p. 8, lines 9 to 10 and 27. See also, e.g., equations (c) & (d) and Table 1, p. 26, line 25 through p. 28; equation (e) and Table 3, p. 36 through p. 37, line 13; equation (f) and Tables 4 and 5, p. 41, line 25 through p. 42, line 8, and pp. 44, 48; Table 2, Page 32; and Table 6, Page 53.

Applicant respectfully submits that the remaining recitations of the pending claims are supported in the subject application as set forth in the Request for Interference filed March 9, 2001, with Claims 63 through 68 respectively corresponding to previous Claims 63/61, 64/63/61, 65/64/63/61, 66/65/64/63/61, 67/65/64/63/61, and 68/67/65/64/63/61, and Claims 73 through 78 respectively corresponding to previous Claims 63/62, 64/63/62, 65/64/63/62, 66/65/64/63/62, 67/65/64/63/62, and 68/67/65/64/63/62. Accordingly, the application is respectfully submitted to be in full compliance with 37 C.F.R. § 1.607(a)(5) as required by the Official Action.

Separate and individual consideration of each dependent claim is respectfully requested.

REQUEST FOR INTERVIEW

Applicant respectfully requests that the Examiner contact Applicant's undersigned representative to schedule a personal interview.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Daniel Albeck", written over a horizontal line.

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TAB 1



PATENT APPLICATION
Attorney Docket No. Q-41616

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TC 2800 MAIL ROOM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of
Kyu TAKADA et al.

Application No.: 08/644,493

Filed: May 10, 1996

For: OPTICAL SCANNER ✓

Group Art Unit: 2872

Examiner: D. Schuberg

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GROUP 2100

AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

In response to the Office Action dated July 7, 1998, please
amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 14, line 10, change "~~carbature~~" to --curvature--;
line 14, change "~~carvature~~" to --curvature--;
line 24, change "~~crross~~" to --cross--.

Page 15, last line, delete "are".

Page 16, line 5, delete "are";
line 9, delete "are".

IN THE CLAIMS:

Please amend the claims as follows:

1. (Amended) In an optical scanner having a source of a light beam, a deflector for deflecting said light beam and an

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B¹ imaging lens that focuses the deflected light beam to form a beam spot on a surface to be scanned, the improvement wherein the curvatures in a sub-scanning direction of at least two of the surfaces of said imaging lens vary continuously along a main scanning direction over the effective area of said imaging lens and independently of the curvatures in the main scanning direction, and wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to the optical axis.

Claim 9, line 1/ delete "any one of".

REMARKS

Applicants thank the Examiner for initialing the references listed on the forms PTO-1449 submitted with the Information Disclosure Statements filed November 20, 1997 and January 16, 1998, thereby confirming that the listed references have been considered.

The foregoing amendments to the specification are intended to correct minor errors.

Claims 1-13 are all the claims presently pending.

The allowance of claims 1-5 in the previous Office Action has been withdrawn.

Claims 3-9 and 11-13 are indicated as being allowable if rewritten in independent form. However, claims 1, 2 and 10 now stand rejected under § 102(b) as being anticipated by Yamakawa. This rejection is respectfully traversed.

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In the previous Office Action mailed September 22, 1997, the Examiner took the position that:

"... the patent of Yamakawa describes, in example 3, two aspherical surfaces (sub scanning curvatures varying along the main scan direction) in the imaging lens. However, the curvatures are varied in accordance with the equation in column 5. This equation also governs the change in curvature in the main scanning direction. Thus, the sub scanning curvature does not vary independently from the main scanning curvature in Yamakawa." (page 3 of the September 22, 1997 Office Action).

In the present Office Action, the Examiner has changed his position. Specifically, he now argues that the two aspherical surfaces in example (embodiment) 3 of Yamakawa (see the bottom of column 6) have curvatures in a sub-scanning direction that vary continuously along a main scanning direction and independently of the curvatures in the main scanning direction. Specifically, the Examiner states that:

"As seen in the third embodiment, there are two aspheric surfaces in the sub scan direction which vary continuously along the main scan direction. It is also seen that the curvatures of the two surfaces in the main scanning direction are also aspheric, and are governed by the same equation, found on column 5, as the sub scan curvatures. However, there is no indication in this equation, or elsewhere in the patent, that the sub scan curvature is dependent on the main scan curvature." (paragraph bridging pages 2 and 3 of the Office Action).

Thus, the Examiner has changed his position with regard to whether or not Yamakawa teaches that the curvatures of the aspheric surfaces in the sub-scanning direction vary independently of the curvatures in the main scanning direction.

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An important aspect of the invention is that the curvatures in the main and sub-scanning directions are independent (i.e., they do not depend on each other). In order to achieve such independent curvature, it is necessary that the curvatures are non-symmetrical with respect to the optical axis. See page 12, lines 3-18 of the specification. In other words, the curvatures are independent only if they are non-symmetrical with respect to the optical axis. Claim 1 has been amended accordingly.

It is noted that the aspheric surface is not a requirement to achieve the independent curvature.

The curvatures in the main and sub-scanning directions in Yamakawa's lens are actually aspherical. However, the aspherical surface is determined by the equation shown in line 60, column 5. In this equation, "y" designates a distance from the optical axis X of the aspherical surface. In other words, the aspherical surface is defined only by the distance from the optical axis no matter which direction it is. Accordingly, the aspherical surface thus defined is symmetrical around the optical axis. Namely, in Yamakawa, the curvatures in the main and sub-scanning directions must depend on each other since the curvatures are symmetrical around the optical axis.

In amended claim 1, as discussed above, the curvature in the sub-scanning direction can be determined independently from the curvature in the main scanning direction since the surface is not symmetrical around the optical axis.

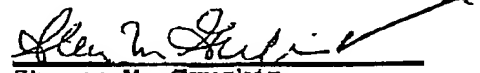
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Thus, for the reasons explained above, Applicants respectfully submit that claim 1 is allowable. Since claim 1 is believed to be allowable, claims 2-13 are believed to be allowable at least by virtue of their dependency. Applicants therefore respectfully request that this application be passed to issue at the earliest possible time.

Should the Examiner have any questions or wish to discuss this application, he is respectfully requested to contact the undersigned attorney at the local exchange listed below.

Please charge any fees necessary to maintain the pendency of this application, except for the Issue Fee, to our Deposit Account No. 19-4880.

Respectfully submitted,


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Date: October 5, 1998

TAB 2

A symmetrical body having the form described by rotating a plane curve about an axis in its plane.